PTO 10-3709

CC=JP
DATE=19910729
KIND=A
PN=03174041

STRING FOR WOVEN, KNITTED FABRICS
[AMIMONO, OMIMONO YO SUTORINGU]

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UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. MAY 2010
TRANSLATED BY: SCHREIBER TRANSLATIONS, INC.

PUBLICATION COUNTRY	(10):	JP
DOCUMENT NUMBER	(11):	03174041
DOCUMENT KIND	(12):	A
PUBLICATION DATE	(43):	19910729
APPLICATION NUMBER	(21):	01311456
APPLICATION DATE	(22):	19891129
INTERNATIONAL CLASSIFICATION	(51):	D 02 G 3/08 D21 H 11/00
PRIORITY COUNTRY	(33):	N/A
PRIORITY NUMBER	(31):	N/A
PRIORITY DATE	(32):	N/A
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DESIGNATED CONTRACTING STATES	(81):	N/A
TITLE	(54):	STRING FOR WOVEN, KNITTED FABRICS
FOREIGN TITLE SUTORINGU	[54A]:	AMIMONO, OMIMONO YO

Specification

1. Title of the Invention

STRING FOR WOVEN, KNITTED FABRICS

2. Scope of Patent Claims

(1) String for woven, knitted fabrics, characterized by the fact that it is formed by slitting a paper containing animal hair fiber, natural cellulose pulp fiber, and wet strength improving agent as essential components in slim shape.

(2) The String for woven, knitted fabrics described in Claim 1, characterized by the fact that the animal hair fiber is descaled wool.

(3) The string for woven, knitted fabrics described in Claim 1 or 2, characterized by containing a fiberous hot water soluble binder.

3. Detailed Description of the Invention

Technical Application Field of the Invention

The present invention pertains to a string for woven, knitted fabrics, which can be woven or knitted into woven or knitted fabrics that can be used as bulky materials for autumn or winter clothing.

Prior art

Natural cellulose fibers or strings formed by mixing rayon or other chemical fibers with natural cellulose fibers have been used as materials for autumn or winter clothing. In particular, the dyeable strings mainly composed of paperbush or manila hemp or other bast fibers or leaf fibers have the name of “paper-ply thread”. The fashion property depending on its unique shape effect has been recognized.

Problems to be Solved by the Invention

However, the strings, which are mainly composed of cellulose fibers have been handled as smooth summer clothing materials because of the shape and the so-called paper-like hard and cold feel like paper. They are only used exceptionally for cold weather or winter clothing materials.

Twisting with wools or bulky alkyls has also been tried. However, the feel of winter clothing material of the wools or bulky alkyls is substantially offset. Such material is only used in some fields.

The present applicant proposes a string that is bulky and soft and feels warm and is suitable for winter clothing material by slitting

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a bulky, soft, and dyeable paper with the fluffy and warm feel of animal hair made by mixing animal hairs with strong cellulose fibers and adding a wet strength improving agent or applying said improving agent in a post treatment. The objective of the present invention is to provide a string for woven, knitted fabrics that is bulky and soft and has good warm-keeping property so that it can be used as raw material for autumn or winter clothing.

Means Used for Solving the Problem

The main point of the first invention is that the string is formed by slitting a paper containing animal hair fiber, natural cellulose pulp fiber, and wet strength improving agent as essential components in slim shape.

The main point of the second invention is that the animal hair fiber is descaled wool.

The main point of the third invention is that the string contains a fiberous hot water soluble binder.

Operation

The first invention provides a string that is bulky and warm and feels warm and is suitable for cold weather and winter clothing material.

The second invention provides a string free of lumps. The third invention provides a string with good tensile strength and tear strength.

Examples of Application

In the following, the application examples of the present invention will be explained.

Examples of the animal hair fibers used in the present invention include the hairs of goat, sheep, camel, rabbit, cashmere, mohair, lama, Angola [goat], and the like. Since these animal hairs are fiberious substances mainly composed of proteins, they can be suitably used as raw materials to solve the problems of the conventional string.

Wool includes spiral crimps, and the expansion and contraction caused by heating and cooling also follows the crimped shape. Therefore, highly bulky paper can be obtained. Because of this fact and the fact that the processing technology is under study, wool is a preferred raw material. There is no special limitation on the type or thickness of the wool. However, since the fibers are usually too long for paper making, it is preferred to use wool with appropriate length. When top-shaped fibers are cut to 3-10 mm, they can be easily used.

Wool has projecting texture known as scale on the fiber surface. When wools with significant scales are dispersed in

water, they will be intertwined with each other to form lumps due to rubbing between the fibers under stirring or in reflux. As a result, the texture or thickness of the paper becomes uneven. The strings obtained by slitting the paper in slim shape will have very low strength in the thin part. This will cause problems during weaving or knitting. Therefore, it is preferred to use the so-called descaled wools as the raw material in the present invention.

An example of the method for removing the scales from wool fibers is the method that applies the scale tip modification technology developed as an anti-shrinkage treatment for woven or knitted wool fabrics to the fiber bundles of wool fibers or wool tops or the like. In this case, the treatment is performed by using a chlorine compound that has the characteristics of an oxidizing agent or other inorganic acidic compound. Another method that can be used is the polymer treatment method that covers scales with a polymeric substance. Several application examples of these scale treatment methods are described in "Fiber Handbook/Processing Section" (Second Edition, Second Publication, published on August 20, 1977, Maruyoshi Corp., p. 912-914).

Since the descaling treatment is usually performed in the top form in the case of wool, it can be easily judged by cutting the tops and performing a dispersibility test.

Since it is difficult to make paper by using animal hair alone, it is necessary to mix the animal hairs with other bonding or adhesive fiberous substances or non-fiberous substances. It is possible to make paper with good quality by mixing with bast fibers, leaf fibers, wood fibers, or other cellulose fibers. The cellulose fibers are separated and extracted from other components by using the well-known pulping method or steaming method and, if necessary, are adjusted to a fibrillated state suitable for paper making by means of bleaching or beating.

The ratio between the animal hairs and the cellulose fibers varies depending on the quality and properties of the targeted strings. In the case of using wools and cellulose fibers, said ratio is preferred to be in the range of 85:15-10:90.

If the wool ratio is higher than 85:15, a lot of fibers will come off or become fluffy as a result of the wet/dry cycles, and the strength also decreases.

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If the wool ratio is lower than 10:90, it is difficult to obtain the fluffy and warm feel.

Examples of the bast fibers include paperbush, paper mulberry, Diplomorpha, mulberry, hemp, ramie, jute, and kenaf.

It is particularly preferred to use, paperbush, paper mulberry, Diplomorpha, mulberry, or other woody basts.

Examples of the leaf fibers include manila hemp, sisal hemp, and the like. They can be used after pulped or bleached by the conventional methods.

Dried craft pulps or other bleached pulps made from needle-leaf trees, broad-leaf trees can be used as woody fibers. The most preferred fibers are long fibers with low degree of beating so that paper with high strength and high tenacity can be made and the fibers suitable for mechanical paper making. Examples of such fibers are paperbush or other bast fibers and manila hemp or other leaf fibers.

The appropriate fiberous hot water soluble binder is polyvinyl alcohol fiber or carboxymethyl cellulose fiber. When this binder is added, the strength of the paper can be improved, and the twisting operation of making fancy yarns from strings obtained from the slitting can be facilitated.

The amount of the binder should be in the range of 0.5-20 wt% of the total fiber amount and it varies depending on the ratio between the animal hairs and the cellulose fibers.

Since the string of the present invention is used as clothing material, it is preferred to have wet strength against dyeing and washing. This can be realized by adding a wet strength improving agent into the paper-making raw material.

Examples of the wet strength improving agent that can be added include the well-known polyamide amine epichlorohydrin resin, polyamine epichlorohydrin resin, polyacrylamide-based resin, urea/melamine resin, and the like, which can be used either alone or as a mixture. In particular, excellent effect can be displayed when it is blended with bast fibers, leaf fibers, wood fibers, or other cellulose fibers.

Another method for realizing wet strength is to use a post-treatment type wet strength improving agent prepared by impregnating a resin dispersion, followed by drying. Since use of hydrophobic resin in this method may cause uneven dyeing in the dyeing operation, it is desired to use in a small amount in the form of uniform attachment. Non-yellowing polyurethane resin, self-crosslinked or reactive acrylkic resin, N-methoxymethyl polyamide resin, or other insoluble resins can be used.

Round net type and short net type paper making machines can be used. The long net type paper making machine that is usually used to make Western paper is undesired in consideration of the strength after the paper is slit into strings.

Slitting is performed by using the conventional slitter for paper yarn to obtain strings with width of 1.0-8.0 mm.

(Application Example 1)

In this application example, a manila hemp pulp was used as the natural cellulose pulp fiber. The manila hemp and caustic soda and water were pulped under pressurization in an autoclave, followed by dewatering, rinsing, bleaching, and dust removal. As a result, a wet pulp was obtained.

60s or 64s wools were used as animal hair fibers and were descaled by using an oxidizing chlorine-based compound (Kroy-finished wool).

In Application Example 1, said descaled 64s wool tops were cut to a length of 5 mm. 60 parts of the wools, 40 parts of the aforementioned manila hemp pulp, and 0.6 part of wet strength improving agent were added into a stirrer. Then, water was added so that the total concentration became 0.25%, followed by dispersion performed under stirring. The slurry was used to make paper with weight of 25 g/m2 by a round-net paper making machine.

The paper-making conditions were such that the press roll pressure was raised to make high-density paper.

The paper of Comparative Example 1 was made under exactly the same conditions except that the 64s wools were cut to 5 mm without being descaled. The paper of the conventional example was made by only using manila hemp pulp as the fiber.

For the wool paper obtained in Application Example 1, no abnormality occurred to the slurry during 1 h of stirring and the

subsequent paper-making process. Uniform thick wool paper was obtained.

For the wool paper of Comparative Example 1, formation of wool lumps was identified 10 min after stirring was started. A fairly large amount of lumps in different sizes were formed when the uniform blending operation was ended. Said lumps were also present in the paper. When the lumps were collected and observed under magnification, it was found that these lumps were formed from intertwined wools.

For comparison with the conventional example, as shown in Table A

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the wool paper of Application Example 1 had a density of 0.259, which was lower than the density 0.488 of the paper made by using manila hemp alone. The wool paper obtained in the application example also felt very soft.

The wool paper of Application Example 1 was rolled into paper tubes and was slit to a width of 6 mm for each paper tube to form strings. The strings were twisted with bulky acrylic yarns to obtain fashion yarns having unique appearance as well as soft and warm feel.

The dyeing operation could be performed by using the conventional dyeing method for wool/rayon blended yarns to obtain beautiful colors.

Table B shows the results of testing various properties for comparison between Application Example 1 and Comparative Example 1.

As can be seen from Table B, the comparison between Application Example 1 and Comparative Example 1 showed that there was almost no difference in the properties, and the adverse effect of the damages to the wool fibers by the descaling treatment was not recognized. In the comparative example, however, the thickness variation due to formation of the lumps was significant. The measured tensile strength was low in the thin parts.

(Application Example 2)

20 parts of the descaled wools used in Application Example 1, 80 parts of manila hemp, and the wet strength improving agent used in Application Example 1 were used under the same conditions to prepare an aqueous slurry by the same method. The slurry was used to make paper by a round-net paper-making machine. Then, the obtained wet paper was attached to a cylindrical roll, followed by forming crape-shaped bumps and dips by a doctor blade

applied against the roll. As a result, wet crape paper was obtained.

The paper of Comparative Example 2 was made in the same way except that the pulp contained no wool.

As can be seen from Table C, the thickness of Application Example 2 increased but the density decreased compared with Comparative Example 2. Therefore, the paper had fluffy and soft feel. Both of the paper were slit in the same way as in Application Example 1 to obtain strings. The strings obtained from the paper of Application Example 2 felt fluffier and softer. Similarly, the strings were twisted with bulky acrylic yarns to obtain characteristic fashion yarns. Dyeing was also performed in the same way as in Application Example 1.

(Application Example 3)

In Application Example 3, descaled 60s wools were cut to a length of 5 mm. 60 parts of the wools, 40 parts of the manila hemp pulp, 1 part of wet strength improving agent, and 2 parts of fiberous polyvinyl alcohol (melting point in water 70°C, 1 denier x 4 mm length) were blended to prepare an aqueous slurry having a fiber concentration of 0.5%. This slurry was stable with very few wool lumps even after 1 h of stirring. The slurry was used to make paper with weight of 25 g/m2 by using a round-net paper-

making machine. The paper-making conditions were such that the press roll pressure was raised to make high-density paper.

Table D shows the comparison between Application Example 1 and Application Example 1, which did not use the fiberous polyvinyl alcohol.

It was confirmed that the wool paper obtained in Application Example 3 had a tensile strength 2.4 times higher and a tear strength 2.4 times higher than the wool paper obtained in Application Example 1.

Both of the paper were slit to obtain strings, which were washed in hot water by using a detergent. The strings obtained from the paper of Application Example 3 had the same fluffy and soft feel as the strings obtained from the paper of Application Example 1. Similarly, the strings were twisted with bulky acrylic yarns to obtain characteristic fashion yarns. Dyeing was also performed in the same way as in Application Example 1.

(Table A)

組成	実施例1	従来例
羊毛	60部	0
マニラ麻	40部	100部
湿潤強度向上剤	0.6	0.6
重さ（g／㎡）	24.9	24.9
厚さ（mm）	0.096	0.051
密度（g／cc）	0.259	0.488
引張強度（縦）	0.93	3.78
引張強度（横）	0.15	0.65
カンチレバー柔軟度（縦）	75	80
カンチレバー柔軟度（横）	35	39

[Column headings, left to right]:

Composition

Application Example 1

Conventional Example

[Row headings, top to bottom]:

Wool 60 parts

Manila hemp 40 parts 100 parts

Wet strength improving agent

Weight (g/m2)

Thickness (mm)

Density (g/cc)

Tensile strength (longitudinal)

Tensile strength (lateral)

Cantilever softness (longitudinal)

Cantilever softness (lateral)

The smaller the value of the cantilever softness, the softer the sample feels.

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(Table B)

組成	実施例1	比較例1
羊毛	60部	60部
マニラ麻	40部	40部
湿潤強度向上剤	0.6部	0.6部
坪量（g／㎡）	24.9	26.8
厚さ（mm）	0.095	0.107
密度（g／cc）	0.259	0.248
引張強度（縦）	0.93	0.80
引張強度（横）	0.16	0.13
伸び（縦）％	1.8	1.9
伸び（横）％	3.1	3.6
湿潤強度（縦）	0.38	0.31

[Column headings, left to right]:

Composition

Application Example 1

Comparative Example 1

[Row headings, top to bottom]:

Wool 60 parts 60 parts

Manila hemp 40 parts 40 parts

Wet strength improving agent 0.6 part 0.6 part

Weight (g/m2)

Thickness (mm)

Density (g/cc)

Tensile strength (longitudinal)

Tensile strength (lateral)

Elongation (longitudinal)

Elongation (lateral)

Wet strength (longitudinal)

The tensile strength and wet strength were measured in kg/15 mm.

(Table C)

組成	実施例２	比較例２
羊毛	２０部	０
マニラ麻	８０部	１００部
湿潤強度向上剤	０．６部	０．０部
重さ（g／㎡）	２１．３	２１．０
厚さ（mm）	０．０６１	０．０４８
密度（g／cc）	０．３５９	０．４５７
引張強度（縦）	１．７６	１．５４
引張強度（横）	０．５０	０．５４
伸び（縦）％	２１．７	１０．５
伸び（横）％	３．１	５．５
湿潤強度（縦）	０．６０	０．６３

[Column headings, left to right]:

Composition

Application Example 2

Comparative Example 2

[Row headings, top to bottom]:

Wool 20 parts

Manila hemp 80 parts 100 parts

Wet strength improving agent 0.6 part 0.6 part

Weight (g/m2)

Thickness (mm)

Density (g/cc)

Tensile strength (longitudinal)

Tensile strength (lateral)

Elongation (longitudinal)

Elongation (lateral)

Wet strength (longitudinal)

The tensile strength and wet strength were measured in kg/15 mm.

(Table D)

組成	実施例３	実施例１
木毛	６０部	６０部
マニラ麻	４０部	４０部
湿潤強度向上剤	０．６	０．６
重さ（ｇ／ｍ²）	２５．０	２４．９
厚さ（ｍｍ）	０．０８７	０．０９５
密度（ｇ／ｃｃ）	０．２８７	０．２５９
引張強度（縦）	２．５５	０．９３
引張強度（横）	０．４４	０．１６
カンチレバー剛軟度（縦）	１１４	７５
カンチレバー剛軟度（横）	３４	３５

[Column headings, left to right]:

Composition

Application Example 3

Application Example 1

[Row headings, top to bottom]:

Wool 60 parts 60 parts

Manila hemp 40 parts 40 parts

Wet strength improving agent

Weight (g/m2)

Thickness (mm)

Density (g/cc)

Cantilever softness (longitudinal)

Cantilever softness (lateral)

The present invention is not limited to the aforementioned application examples. Various modifications can be made without departing from the gist of the present invention.

Effects of the invention

As described above, since the first invention takes advantage of the warm and fluffy quality feel of animal hairs and uses bulky, soft, and dyeable paper, the strings for woven, knitted fabrics have fluffy and warm feel as well as high bulkiness, softness, and warm-keeping property and are particularly suitable for winter clothing materials.

The second invention provides strings free of lumps. The third invention provide strings with good tensile strength and tear strength.

The third invention provide strings with good tensile strength and tear strength.

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Spontaneous amendment

December 29, 1989

To the Commissioner of the Patent Office: Mr. Fumitake Yoshida

1. Identification of the case

Japanese Patent Application No. 311456 of 1989

2. Title of the invention

String for woven, knitted fabrics

3. Amender

Relationship to the case: Patent applicant

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5. Document to amend

Detailed Description of the Invention of the Specification

6. Amendment contents

(1) Description of “autumn and winter” in line 1 on page 2 of the specification is amended to “spring and summer”.

(2) Description of “particularly suitable.” in line 6 on page 7 of the speciation is amended to “suitable.”.

(3) Description of “suitable[typo]” in line 15 on page 7 of the speciation is amended to “suitable”.

(4) Description of “even as” in line 6 on page 8 of the specification is amended to “as”.

(5) Description of “its inside” in line 9 on page 8 is amended to “inside”.